CLAIMS

1. A method for producing a single crystal with pulling the single crystal from a raw material melt in a chamber by Czochralski method, wherein when growing the single crystal, where a pulling rate is defined as V (mm/min), a temperature gradient of the crystal at the vicinity of solid-liquid interface at a central portion of the crystal is defined as Gc (°C/mm), and a temperature gradient of the crystal at the vicinity of solid-liquid interface at a peripheral portion of the crystal is defined as Ge (°C/mm) during growing a straight body of the single crystal, the temperature gradient Gc of the crystal at the central portion of the crystal and the temperature gradient Ge of the crystal at the peripheral portion of the crystal are controlled by changing a distance between a melt surface of the raw material melt and a heat insulating member provided in the chamber so as to oppose to the surface of the raw material melt, thereby $\Delta G = |(Gc - Ge)|$ which is difference between the temperature gradient Gc at the central portion of the crystal and the temperature gradient Ge at the peripheral portion of the crystal is 0.5 °C/mm or less, and also V/Gc ($mm^2/°C \cdot min$) which is a ratio of the pulling rate V and the temperature gradient Gc at the central portion

of the crystal is controlled so that a single crystal including a desired defect region is grown.

2. The method for producing a single crystal according to Claim 1, wherein the single crystal is pulled with keeping the pulling rate V constant.

3. The method for producing a single crystal according to Claim 1 or Claim 2, wherein V/Gc is controlled so that the defect region of the single crystal to be grown is N region over a whole plane in a radial direction.

4. The method for producing a single crystal according to any one of Claims 1 - 3, wherein the distance between the surface of the raw material melt and the heat insulating member is changed by adjusting an elevation rate of a crucible containing the raw material melt to move a level of the raw material melt up and down and/or by moving a position of the heat insulating member up and down.

5. The method for producing a single crystal according to any one of Claims 1 - 4, wherein the distance between the surface of the raw material melt and the heat insulating member is 30 mm or more.

6. The method for producing a single crystal according to any one of Claims 1 - 5, wherein the distance between the surface of the raw material melt and the heat insulating member is changed automatically according to a changing condition obtained by performing an experiment beforehand.

7. The method for producing a single crystal according to any one of Claims 1 - 6, wherein a changing condition that changes the distance between the surface of the raw material melt and the heat insulating member is adjusted among batches for producing the single crystal.

8. The method for producing a single crystal according to any one of Claims 1 - 7, wherein a silicon single crystal is pulled as the single crystal.

9. A single crystal produced by any one of methods for producing a single crystal according to Claims 1 - 8.